the physicist are in most thorough disagreement. Are there no more fossils below the base of the Cambrian to illumine this dark period? In the Lower Cambrian of North America, according to Mr. Wolcott, one of the leading authorities on the Cambrian time, there are as many as 160 species, and these cover all classes of marine invertebrates. Clearly, then, in the Lower Cambrian we are not near the beginning of life on this planet, and surely we are not near the earliest preserved remnants of life.

The rocks in North America which are older than the Cambrian are divided by Dr. Dawson⁽¹⁾ in descending order, as follows:—

1. Keweenawan.

2. Animikie.

Here throughout a great part of North America, there occurs a profound unconformity.

3. Huronian.

4. Upper Laurentian or Grenville Series.

5. Lower Laurentian or Fundamental Giude ...

It is evident that if fossils are found in any of these groups the Paleozoic division must be extended downward to include such groups and the Archican division be that much diminished. A problem, then, of enormous importance awaits solution by the geologist. How much further down than the recognized Lower Cambrian will he be able to carry the record of fossil forms? In the present state of our knowledge we find vast areas of these older rocks which seem to be sedimentary, but which appear to contain no fossils, vast areas regarding which we are not sure whether they were sedimentary or not, and again vast areas which we believe we have proved never to have been sedimentary. About this confused period floods of argument have been written and many hypotheses advanced, but what we want are fossils. Fortunately we have a few, although they do not help us very materially. Mr. G. F. Matthew, who constitutes our main authority in Canada on the subject, considered palacontologically, has established as pre-Cambrian, but Palæozoic, beds in New Brunswick and Newfoundland which he calls Etcheminian,⁽²⁾ and which Sir William Dawson thinks to be equivalent to the Keweenawan.⁽³⁾ They contain "but a meagre fauna, mostly animals of a low type of structure, as Protozoans, Brachiopods, Echinoderms, and Molluscs," with wormburrows and trails. Mr. Walcott, in a memoir on the Lower Cambrian.⁽⁴⁾ writes as follows:-

"The section laid bare in the Grand Cañon of the Colorado. beneath the great unconformity at the base of the known Cambrian, shows 12,000 feet of unaltered sandstones, shales, and limestones. that. I think, were deposited in pre-Cambrian time and should be referred to the Algonkian (Keweenawan). The entire section of pre-Cambrian strata is unbroken, and the sandstones, shales, and limestones are much like those of the Ordovician section of New York. In a bed of dark argillaccous shale, 3,500 feet from the summit of the section. I found a small Patelloid or Discinoid shell, a fragment of what appears to be the pleural lobe of a segment of a trilobite, and an obscure. small Hyolithes, in a layer of bituminous limestone. In layers of limestone, still lower in the section, an obscure Stromatoporoid form occurs in abundance. These fossils indicate a fauna, but do not tell us what it is." In the same memoir, in a note at the foot of page 552, Mr. Walcott mentions the discovery of Saltere'la and fragments of a trilobite, 500 feet below a series of beds in Vermont which are 700 feet thick, of conformably bedded lime-

(1) G. M. Dawson. Presidential Address, Geological Section, B.A.A.S., 1897.

(2) G. F. Matthew. The Protolenus Fauna, Trans. N.Y. Acad. Science, vol. xiv., page 105, 1895.

(3) Sir W. Dawson. Note on Cryptozoon and other Ancient Fossils, Can. Record Science, vol. vii., page 203, Oct. 1896.

(4) C. D. Walcott. The Fauna of the Lower Cambrian, etc., U.S. Gov't Surv. Annual Report, page 550, 1858-9.

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